low stage of development. But this would seem to be altogether incredible, when we reflect on the immense lapse of time intervening since the dispersion, as shown by the vast accumulations of kitchen middens on many parts of the coast, and by the numerous stone implements that are constantly being turned up, some belonging to an age answering to the Neolithic, some even to the Palæolithic period of Europe. "Chips for cutting and scraping, fragments of tomahawks and pieces of black basalt are found on the low silurian ranges near the rivers and creeks in all parts of Victoria; and wherever the soil is dug or ploughed over any considerable area, old tomahawks are turned up, thus showing the immense period of time that the land has been occupied by the native race." Introd. lvii. Some of the kitchen refuse heaps are over an acre in extent, and "there are also some large shell-mounds on the coast, especially near Cape Otway, where the largest is about 300 feet long, 40 or 50 feet wide, and 16 feet high. It must have taken ages for the fish-eating natives of the coast to build up such heaps" (ii. 234). It seems inconceivable that during all these ages they should never have made a single step in advance of the numeral "two," assuming that this had been inherited from the outset. Hence the first hypothesis appearing to be the most reasonable, the argument for racial unity based on the general currency of the word for "two" falls to the ground. All the reasons for the prevalent belief in the original unity of the Australian languages are briefly resumed at pp. 43 and 44 of Introduction. None of them, except that drawn from their common phonetic system is, perhaps, very cogent; but altogether, taken in connection with other circumstances, go a long way towards justifying the general conclusion arrived at by Threlkeld, Grey, Schürmann, Moore, Bulmer, Hartmann, Hagenauer, and nearly all recent Australian philologists.

The work is rendered still more complete by a final section devoted to the Aborigines of Tasmania. Here nearly everything is brought together that is ever likely to be known regarding the physical and mental characteristics, habits, speech, implements, dress, ornaments, &c., of that extinct race. The difficult question of their origin and affinities is fully discussed, and ethnologists will feel specially thankful for the reprint of Dr. Joseph Milligan's valuable paper "On the Dialects and Language of the Aboriginal Tribes of Tasmania and on their Manners and Customs," which appeared originally in the Journals of the Royal Society of Tasmania. The importance of this contribution to Tasmanian ethnology is due to the fact that the compiler "was for many years Medical Superintendent of the Aborigines' Establishment, first at Flinders Island, and afterwards at Oyster Cove, to which the remnant of the race was removed in the year 1848" (ii. p. 480).

Mr. Smyth evidently regards the Tasmanians as belonging to a different stock from the Australians. They "are darker, shorter, more stoutly built, and generally less pleasing in aspect than the people of the continent. Their hair was woolly and crisp, and some bore a likeness to the African negro. Their aspect was different from that of the Australians. In their form, their colour, and their hair they were rather Papuan than Australian" (Introd.," lxix.). This last sentence probably goes very near the truth, and there can be little doubt that the island was peopled "by some members of the dark-skinned populations of the north" (lxxi.). Their woolly[1] or at least frizzly hair is alone conclusive as to the presence of Papûan blood. But there are, on the other hand, scarcely less clear indications of Australian affinities. The compiler himself admits that "they were not all alike," adding that "there is reason to believe that the members of some tribes were scarcely distinguishable from the Australians" (ii. 379). On the whole, the balance of evidence goes to show that they were a mixed race in which the Papûan element was predominant, and in which special features had been developed by long local seclusion.

This race is generally stated to have become extinct with William Lanney and Truganina ("Lalla Rookh"), the former of whom died in March, 1869, the latter in June, 1876, but some half-castes are still living, "and it is nearly certain that the blood will mix with that of the whites and never be lost. But the race, the traditions of the race, and the language are lost for ever" (ii. 384).

It remains to be stated that the work is well printed and richly illustrated throughout. It is also supplied with an index, which might be fuller, and with two maps on a large scale—the Australian Continent and a tribal map of Victoria. The few misprints that occur will doubtless be corrected in future editions, when the curious English sentence at p. 79, vol. ii., beginning with "However I am inclined," might also be re-cast. There seems to be also something wrong with the paradigm given at p. 30, vol. ii. of the verb *to go*, unless it be made up of three different roots (*Yangan*, *blanga*, and *plapa*); but if so, the fact should be stated. As it stands, the arrangement of tenses is about as intelligent as that of the same verb in popular English and French grammars.

A. H. KEANE

ON THE MAGNETISM OF ARTIFICIAL MAGNETS

Sur le Magnétisme des Aimants Artificiels. Par V. S. M. van der Willigen. (Haarlem: Les Héritiers Loosges, 1878.)

VISITORS to the Loan Collection of Scientific Apparatus at South Kensington in 1876 will remember a remarkable series of permanent steel magnets contributed from the museum of the Teyler Foundation of Haarlem. Most of these were the work of a famed artificer of the name of van Wetteren, who during a period of thirty years has been occupied in the construction of magnets of excellent quality, under the advice and with the co-operation successively of MM. Logeman, Elias, and van Willigen. The last named of these, whose posthumous monograph lies before us, devoted himself for the last four years of his life to important researches in magnetism.

The memoir, published originally in the *Transactions* of the Teyler Museum, commences by explaining the methods adopted in fusing, tempering, and magnetising the bars of steel. A succeeding chapter describes the

[1] "As woolly as that of any native of Guinea" (Cook); "black and woolly" (R. N. Davies); "woolly hair" (Lieut. Breton); "courts, laineux et crépus" (M. F. Péron).

methods employed in measuring the distribution and amount of their magnetism. Then come three long chapters recounting very minutely the details of the dimensions, weight, strength, &c., of no less than forty-six individual magnets, together with particulars of the successive magnetisations imparted to them. The work concludes with a discussion of results and of the formulæ for empirically representing them, and with a brief obituary notice of the author, by Dr. Figee.

It appears from the observations of the constructor, van Wetteren, that bars of steel of apparently equally good qualities in other respects will not make equally good magnets; a point which the author tells us he was unwilling to recognise until he found all the magnets fabricated from one bar inferior to *all* the magnets fabricated from a bar of what appeared to be equally good steel. English bar steel was found inferior by comparison with that manufactured on purpose by M. Wetteren, but the author confesses his inability to assign any reason for the inferiority. Concerning the details of forging and tempering a judicious silence is maintained. The method of magnetisation which was found most efficacious both for bar and horse-shoe magnets, was to place their extremities upon the poles of a powerful electro-magnet of the form constructed by Ruhmkorff for diamagnetic experiments; and then, while thus magnetised above saturation, to remove them after having applied the appropriate keeper. For magnets weighing so much as half a kilogramme an Elias ring was also applied as an auxiliary in the process of magnetisation. The maximum power was not developed until after two or three such magnetisations, the keeper being momentarily removed between each repetition. Reversal of the poles always produced consequent points. The methods of touch, the best of which the author considered to be Hoffer's method of stroking the horse-shoe magnet with a second horse-shoe of soft iron from the poles toward the equator of the magnet, he finally rejects, *in toto*, as being hurtful to the strength and regularity of distribution of the magnetism.

The most important part of the memoir is that devoted to a discussion of the portative force of magnets. Häcker has given the ratio between the portative force of a horse-shoe magnet and that of a bar-magnet of the same weight and length as two to one. M. van Willigen found the ratio with an actual magnet of Häcker to be as three to one; and with van Wetteren's magnets more than four to one. The empirical formula assigned by Bernoulli to express the relation between the weight of a magnet and its portative force is—

$$p = CR^{\frac{2}{3}},$$

where p is the weight which the magnet will sustain, R its own weight, and C a coefficient dependent on the quality of steel and other undetermined conditions. A magnet was adjudged good by the author's standard for which Bernoulli's coefficient had a value of 20 or 21; though 22·5 was occasionally attained. The empirical formula now assigned by van Willigen for the portative force of supersaturated magnetisation is—

$$P = aK\sqrt{S}.\sqrt[4]{\frac{l}{\sqrt{S}}};$$

and for the permanent portative force—

$$p = \beta K\sqrt{S}.\sqrt[4]{\frac{L}{\sqrt{S}}}\cdot\frac{L}{l},$$

where K is the perimeter and S the area of the polar surfaces, l the length of the bar, L the reduced length (or distance between the actual poles or points of maximum free magnetism), and a and β two coefficients depending on temperature, quality of steel, temper, &c. It will be seen that since for magnets of similar form the quantity $K\sqrt{S}$ is proportional to the $R^{\frac{2}{3}}$ of Bernoulli's formula, M. van Willigen has determined that factor of the coefficient which is concerned with the length of the magnet and the position of its poles. It would be interesting, though out of place here, to compare these results with those recently obtained by M. Petrowchevsky in his researches on the distribution of magnetism in magnets.

The author falls into the common error of ascribing to M. Jamin the invention of magnets made of laminæ of steel bound together in bundles. Magnets of this description were employed by Dr. Scoresby in his Arctic explorations at the beginning of the century, and may still be seen in the Whitby Museum, where they are deposited. Similar magnets were in even earlier use by Duhamel and Coulomb; and a magnet almost the counterpart of those of Jamin is described in a memoir on magnets by Geuns published at Venlo, in Holland, in 1768.

SILVANUS P. THOMPSON

OUR BOOK SHELF

Mittheilungen aus dem k. zoologischen Museum zu Dresden, herausgegeben mit Unterstützung der königlichen Sammlungen für Kunst und Wissenschaft. Von Dr. A. B. Meyer. Drittes Heft, mit Tafel XXVI.-XXXV. (Dresden: Baensch, 1878.)

DR. MEYER has now issued the third volume of his "contributions" to science from the well-filled stores of the Dresden Museum—a volume which quite equals its precursors in value and interest. The Director first gives us an account of his new cases for the exhibition of zoological objects, and supplies exact details as to their cost. These particulars may be useful for those engaged on the fittings of several other national museums which are now in process of erection. A contribution from M. Edm. de Selys-Longchamps, which follows, contains a general account of the dragon-flies of New Guinea and the Moluccas, and descriptions of a large number of new species of these insects. We have next an account of the human skeletons and skulls in the Dresden Museum, drawn up by the Director and Herr E. Tungel jointly. The number of skulls in the collection is stated to be 836. We have then an important article by our countryman, Mr. R. Bowdler Sharpe, on the collections of birds belonging to certain groups, made by Dr. Meyer during his expedition to New Guinea and the Moluccas. The groups treated of in this paper are the Accipitres, Dicruridæ, and Campophagidæ, of all of which divisions Dr. Meyer obtained a goodly series of specimens, embracing among the Campophagidæ examples of nine new species.

Dr. Kirsch, the Entomologist of the Dresden Museum, follows Mr. Sharpe with descriptions of some new wasps found in the collection, and the volume is concluded by a second portion of Dr. Meyer's memoir on the Papuan skulls of which he obtained such a splendid series during his Eastern Expedition.

It is quite evident that the present director of the Dresden Museum is not only capable of doing good work